



Plants in the Classroom: The Story of Oklahoma Turfgrass

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Introduction

Oklahoma is part of the Great Plains, a large stretch of relatively flat land covered in grasses between the Mississippi River and the Rocky Mountains. Weather varies widely in this region and winds can be very high, as referred to in our state song *Oklahoma!*, “when the wind comes sweepin’ down the plain!” Our state grass, Indiangrass, grows up to 5 feet tall, and is found in all Oklahoma counties.

The grass family (*Poaceae*) is one of the largest plant families, with more than 11,000 species. It is also one of the most important plant families for humans, with functional qualities including providing food for humans (such as oats, rice, wheat and corn), feed for livestock, soil stabilization and surfaces for recreation (such as sports fields and golf courses), in addition to aesthetic qualities (parks and landscapes). Grasses became a dominant life form on earth at least 70 million years ago, during the Cretaceous period. The evolution of grazing herbivores also occurred at this time, with natural selection giving rise to grasses adapted to survive close grazing.

Short grasses have been important to humans throughout history. Thousands of years ago in Africa, low grasses and open savannas made it easier for humans to stalk their prey, while allowing them to keep an eye out for potential predators. As livestock became domesticated, they were kept close to home to provide a clearing between human homes and forests filled with predators. In Medieval days, lawns around castles made it easier for watchmen to scan the area for potential invaders. Today there is less need for protection from animal predators and invading armies in many parts of the world, but the demand for short grasses is still very strong.

Though there are thousands of species of grasses, only about 50 are suitable for use as turfgrass. “Turf” is an Old English term first used before 900 CE. It is related to the Sanskrit word “darbha” which means a tuft of grass. Turf is not always comprised of grass species, but by definition, turfgrass is only grass species. The ideal turfgrass for lawns and sports fields is a green, dense stand of plants with a low growth habit that is tolerant of both freeze and drought, and can handle foot traffic without showing signs of wear. Humans have been selectively cultivating favored turfgrass species for hundreds of years to fit their needs. The late turfgrass scientist Dr. James Beard explained this behavior, “Turfgrasses were developed by modern civilizations in order to enhance the quality of life of humans. The more technically advanced a civilization, the more widely turfgrasses are used” (as quoted in *Lawns and Lawn History*).

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Grasses in European Society

According to literature from the 1100s, areas of low-growing perennial grasses were used primarily for sport and were grazed by livestock or cut by hand using scythes. The grass areas used for lawn bowling were probably the first turfs maintained for recreation, although they were composed of low-growing grasses together with low-growing meadow flowers, not solely grasses. Sod (strips of grass together with the adhering soil), rather than seed, was normally used to establish turf (the first description of sodding was mentioned in a Japanese book in 1159). One of the first sports played on turf was cricket. By the 1400s, low-growing grasses were seen in paintings of private and public gathering spaces.

By the 1500s, turfgrass was found in the formal gardens of the wealthy in Great Britain, Germany, France, the Netherlands, Austria and in northern Europe. Many European towns had a common area with grass used for sports and recreation. At that time, soccer was beginning on public greens in England and golf was becoming a sport on the natural seaside grasses in Scotland. Grazing sheep provided the mowing on these greens. The word “lawn” refers to a managed grass space and dates to no later than the 1500s, and at that time was a name for open space or glades in the woods.

In the 1600s, turf was used in and around gardens, lawns and greens, and “lawn” was used to refer to a stretch of untilled land covered in grass. In 1665, recommendations were published regarding preparing a planting bed, selecting turfgrass seed, harvesting sod and even transplanting grasses for golf courses. By the 1700s, turf was becoming commonly used in cemeteries, and “lawn” referred to a portion of a garden or landscape covered with grass and closely mowed. The gardens at Versailles had a small tapis vert “green carpet” of grass, and this feature became common in French gardens.

Grasses in Early America

When Europeans arrived on the East Coast of what is now the U.S., the landscape had already been altered by Native Americans. In forested areas, Native Americans often cleared trees and used controlled burns to control the underbrush and better facilitate hunting and travel. These actions changed forested areas to more open areas with increasing amounts of grasses. There were no pasture grasses native

to the East Coast, just annuals like wild rye and marsh grass. These grasses had lower nutritional value than the grasses of northwestern Europe, so the livestock that arrived with the first Europeans did not fare well. The livestock ate what was available, which were native plants, then either starved or ate poisonous plants to keep from starving. With the arrival of more cattle, sheep and goats from Europe, the native grasses all but disappeared.

Today, native grasses continue to persist in the region where they originated, while grasses that have been distributed by man and are established in, adapted to and persist in their new environment are called naturalized grasses. Settlers in the 1600s had grass and clover seeds brought to America to grow feed for their domesticated animals. These imported grasses spread and became naturalized as settlers moved westward into the interior of North America: Bermudagrass and Guinea grass from Africa spread in the southern U.S., and bluegrass from Europe and the Middle East spread across the Appalachians and the Midwest. Spanish missionaries brought grasses from the Mediterranean to the California frontier to raise in place of the native bunchgrasses.

By the 1700s, these naturalized grasses provided enough food for livestock, but overgrazing left briars and bushes. As farmers recognized the value of cultivated grasses as a source of hay, seed houses and nurseries were established in Philadelphia to supply the need for more seeds of introduced grasses. At the same time, landscapes in England and France were trending to more open areas with closely mown grass. Though there was less travel between Europe and America after the Revolutionary War, European ways were still seen as a sign of success and the design of American homes and their surroundings were copied from European literature and paintings. In most cases, this meant a flower garden in front and an enclosed lawn in the back.

Prominent and wealthy Americans emulated the Europeans. Thomas Jefferson and George Washington had their landscapes at Monticello and Mount Vernon designed to look like those of English country estates. Images of Washington's Mount Vernon were distributed across the U.S. in the 1700s and 1800s and gave wealthy people something to aspire to; the perception was that this new landscape was "American." The first documented American use of the term "lawn" was in 1773 and referred to smooth, grassy ground that was closely mowed and located in front of or around a building. In 1806, Bernard McMahon wrote *The American Gardener's Calendar*, the first major American book on horticulture and landscaping, with monthly lists of tasks to accomplish each month, though most Americans had no appreciable landscaping.

Grasses in Oklahoma

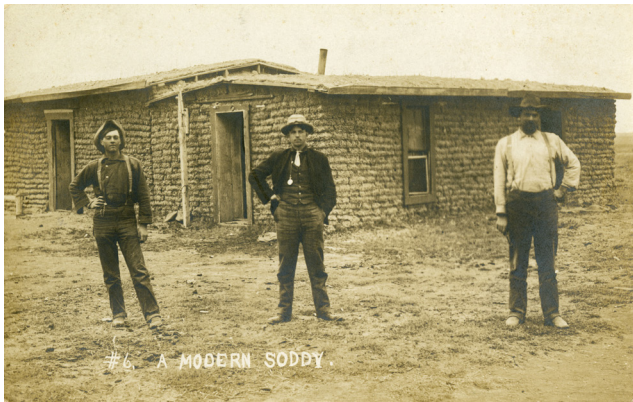
Prairies began appearing in the central part of North America 8,000 to 10,000 years ago. Up to 60 different species of grasses represented 80% of prairie plants. Climates in the prairie regions range from hot and dry to cold and wet; grasses in different regions adapted to different environments, many of them harsh. The drier areas had short grasses such as buffalograss, blue grama and hairy grama. Taller grasses, sometimes up to 8 feet tall, grew in wetter environments. These included big bluestem, Indiangrass, switchgrass and eastern gamagrass. Mid-grass prairies had a mix of short and tall grasses depending on the areas of moisture, with abundant side-oats grama and wheatgrass.



The Great Plains had enough rain to grow a thick layer of grasses that supported huge herds of buffalo, a major source of food and clothing for the Native Americans on the Plains. Some native tribes even used grasses for shelter. From about 800 to 1700 CE, the Caddo and Wichita tribes made large, beehive-shaped homes referred to as Wichita Indiangrass huts or Wichita walkup dwellings. These homes were found in areas around East Texas, including parts of what is now Oklahoma. Compared to tepees, these grass huts were much larger — up to 50 feet tall with multiple families living inside. Long, solid wooden poles were driven into the ground by men and women, often as a community event, in a circle 30 feet to 50 feet across. A grid of smaller branches was laid across the poles, and bundles of reed or grass were woven together on the lattice of branches. This thatch was tightly woven, making the home water- and windproof. The thatch also served as insulation.

As settlers arrived in the Great Plains, they, too used grasses for shelter in many areas, since timber was scarce. Instead of weaving grasses together, though, these early settlers made houses of sod, called "soddys." Sod houses measured about 14 feet by 16 feet, with walls about 7.5 feet tall. A soddy had one door in the middle of one of the long sides of the house and one or two windows. When a home site was chosen, the earth was packed flat to make the floor. Then a breaking plow pulled by horses was used to cut sod strips (from prairie grasses) that were about 12 to 18 inches wide and 3 inches to 4 inches thick. Those were cut with a shovel into blocks 2 feet to 3 feet long. Only sod that could be used that day was cut; dry sod would fall apart and was hard to work with.

The walls of the soddy were 2 feet to 3 feet thick, with staggered blocks of sod laid grassy side down. To add strength to the walls, a layer of sod was laid crosswise every three or four layers. Wooden frames were placed in the locations of the windows and door as the sod was laid. At each end of the soddy was a support pole with a ridgepole laid across them. Poles were used for rafters, and the roof decking was of poles or brush. Sod blocks went on top of the decking, either grassy side down and coated with plaster, or grassy side up and allowed to keep growing. Finally the door was hung and the window frames were filled with oiled paper. The inside walls were covered in plaster or newspaper, and sheets were suspended from the ceiling to keep soil from falling in from the roof (as well as mice, snakes and other animals in the sod!). There is one remaining sod house on display in its original location in the Sod House Museum in Aline, Oklahoma. It is



made of buffalograss and is the only remaining sod house built by a homesteader. Marshal McCully, the builder of the Aline soddy, took part in one of Oklahoma's largest land runs in 1893.

Buffalograss could tolerate the wear and tear of large grazing animals such as buffalo, but as settlers moved in and overstocked land with cattle, it was overgrazed. Improved Bermudagrass however, offered good grazing for cattle. Farmers were reluctant to plant Bermudagrass after fighting the invasive grass for so long in their cotton and corn fields. A farmer in Kay County, having seen farms in Tennessee "ruined" by Bermudagrass, upon reading an endorsement in the *Oklahoma Farm Journal* for use of Bermudagrass, wrote to the editor, "You will live to see the day when Oklahoma farmers will want to make a Bermudagrass rope and hang you to the highest limb of the largest tree in Oklahoma (Skaggs, p. 118)." Ranchers, however, were interested in using Bermudagrass in their pastures.

The Rise of American Suburbs and Development of the American Turfgrass Lawn

Cities in the 1800s were associated with crime and congestion, and pollution. Industrial Revolution pollution made them less healthy places to live. Health and social concerns drove the upper and middle classes into the countryside and away from the cities. Oklahoma City, incorporated in 1890 after the land run of April 22, 1889, was originally 15 blocks long and five blocks wide. Soon after, the founding fathers of Oklahoma City started buying nearby farmland to make room for new housing. Streetcar lines connected the growing city to neighborhoods further out, and by the 1930s the areas along those lines were developed.

Most Americans still had no front yard by the mid- to late-1800s, and made no attempt to beautify their home's surroundings. Yards were often barren, with trash piles outside the doors and bare soil with whatever native grasses grew on their own. Yards were often kept bare on purpose, especially in the southern states, to keep mosquitoes, snakes, rodents and fires away from the house.

After the Civil War, there was a period of economic growth and the wealthy were the first to have and maintain lawns. Lawn maintenance was done by hired hands and included agricultural chemicals for weed and pest control; those expenses were beyond the average homeowner's income. But there was a growing awareness of lawns in the middle classes,

and "lawn" became an everyday word. Newspapers began to include gardening advice to boost circulation, and articles on lawn care described how to create a "correct lawn." As more people moved out of the cities and faced daily commutes, homeowners were pressured to make their front yards pleasing to passersby. Community leaders also wanted homeowners to green their yards with lawns and gardens to serve as examples for the "uneducated" or lower classes. The wealthy and elite led town beautification projects to clean up and maintain town commons.

In the late 1800s, Frederick Law Olmsted started the public park movement, believing all people should be able to experience green areas for their health and well-being. His parks provided city dwellers communal green spaces and influenced the design of suburban communities forming around cities on the East Coast (Boston, Philadelphia, New York) because of the expansion of railroad, streetcar and trolley lines. Olmsted also designed the first planned community in the U.S. near Chicago in Riverside, Illinois, providing each house with a lawn. These communities were modeled after parks and often had "park" in their name.

The late 1800s saw a shift in American culture from a producer society to a consumer society, and by 1896 the Sears, Roebuck and Company catalog offered lawn equipment for sale. Architectural pattern books for home builders illustrated house plans using grass lawns to showcase the home foundations; these were copied by builders, lawns and all. Progressive groups also aimed to spread middle-class values and improve the looks of urban areas, putting pressure on communities to move the houses away from the street, plant front lawns and remove fences to emulate green park space. The author of an American horticulture book in 1897 hoped that someday homes would not have so many unkempt, weed-grown yards, since many Americans still considered grass utilitarian.

At the turn of the century, golf was introduced in the U.S. and quickly became popular. The first American golf course was established in a cow pasture in New York in 1888. By 1902, there were more than 1,000 courses in the U.S. Golf was a Scottish invention, and a Scottish immigrant, Alexander Findlay, was one of the first golfers in the U.S. He designed the golf course at the Guthrie Country Club, which was first played in 1900, pre-Oklahoma statehood. The Oklahoma Open started in 1910 and is regarded as one of the top state opens nationwide. Perry Duke Maxwell, a founding member of the American Society for Golf Course Architects and considered one of the greatest American golf course designers, designed



his first course on his dairy farm outside of Ardmore. Since 1910, Oklahoma has been a big player in American golf, hosting more than 300 professional, amateur and intercollegiate events and championships.

The introduction and popularity of golf influenced the development of suburbs. Green, well-kept golf courses made attractive areas for homes; golfers wanted to make their yards look like part of a golf course. Early golf courses used creeping bentgrasses for putting greens, but golfers were told many inputs were needed to keep it looking good. As the focus on grass quality increased, the lawn-care industry was born.

Along with the spread of lawns in middle-and upper-class suburbs came pressure to keep the lawns looking healthy. Garden clubs educated the public about the aesthetic importance of lawns and gave advice on growing them. Sometimes they resorted to peer pressure to turn front yards into well-manicured lawns, including holding lawn contests for children to teach them “the value of orderliness and beauty of lawn, garden and home . . . [so that they will] be able to recognize at a glance the difference between careless, slovenly surroundings as compared with well-kept grounds (Jenkins, p. 41-42).”

Some people thought garden clubs were helping to end the Depression, since their efforts encouraged families to beautify their property, ushering in “community prosperity, peace and contentment (Jenkins, p. 43).” In Oklahoma, multiple garden clubs were organized. On October 6, 1929, the Tulsa Garden Club was established by 23 members, with the purpose “to increase personal knowledge of botany and to bring more gardens to Tulsa.” The Tulsa Rose Garden was started in 1935. *Better Homes and Gardens* magazine sponsored Junior Garden Clubs for children starting in 1929 and by 1936, almost 60,000 Junior Garden Clubs had 370,000 active members. The Junior Garden Clubs were urged to plan annual citywide clean up events and members were awarded points for maintaining their front lawns. Members also were encouraged to help take care of their neighbors’ lawns.

Soldiers returning from World War II and starting families created demand for affordable housing and a house with a lawn symbolized the American dream. The federal government financed low-cost mortgages, and builders created blue-collar tract housing with lawns to mimic the upper-middle class suburbs. In 1952, Abraham Levitt and his sons created a “cookie-cutter” community named Levittown on Long Island, with lawns at each home, drawing national attention. In the 1950s the definition of “lawn” was “land covered with grass kept closely mown, especially in front of or around a house,” but not necessarily with just one type of grass. Even Levitt, who imposed rules on the residents of Levittown, such as lawn mowing at least once a week, felt that crabgrass and clover were “just as nice as other grasses.”

Technologies Associated with Turfgrass

Grass was originally mown with scythes, which required a lot of labor (meaning only the wealthy could afford to maintain areas of grass) and produced uneven cuts. The first mechanical reel lawn mower was invented in England in 1830 by an employee of a textile mill. Edwin Beard Budding came up with the design after watching the rotary shears that shaved carpets to give them a smooth finish. The lawn mower allowed the less affluent to maintain lawns. In 1841, Alexander Shanks of Scotland created a pony-pulled mower that rolled the grass and removed the clippings. The ponies wore leather shoes to

avoid leaving hoofprints. The first lawn mowers in America in the late 1860s were owned by less than 1/2 of 1 % of people, mainly in New England. Everyone else had cattle or sheep to “mow.” Mass production of lawn mowers by 1890 made mowers more affordable for the average family.

As city water reached more homes, caring for lawns became easier. At first homeowners had to water the lawn by hand. In 1871, Joseph Lessler of New York patented the first “portable water fountain and sprinkler,” saving time spent watering the lawn. However, so much lawn watering transpired that some city councils were concerned about using excessive water during droughts.

At the 1876 International Exhibition in Philadelphia, the USDA had a display on the formation and maintenance of lawns, which they described as a “selection of grasses forming a thick-set lawn in six weeks from time of sowing; also after management (Jenkins, p. 31).” However, lawns were still a new idea to most people. Only one lawn sprinkler was exhibited at the Centennial Exposition (and no lawn mowers).

Years of affluence after World War II brought opportunities for manufacturers of all kinds of products, along with the worry that demand would not stay up forever. To continue increased demand for post-war technologies such as rotary mowers, pesticides, fertilizers, weed control, hose-end sprayers, drop and rotary spreaders, equipment for aeration and dethatching, etc., lawn care companies emphasized the perfect lawn – a super green carpet of one species of turfgrass with no weeds present.

Turfgrasses are tolerant of continuous defoliation through mowing or grazing. In Oklahoma, regular mowing is required to maintain lawns. Without regular mowing, the lawn will lose its turfgrass qualities (as a continuous ground cover community with intermingled roots and shoots) and become home to taller vegetation through time. This progression of species from turfgrass to taller herbaceous plants and even woody plants, is called succession and is observable in neglected lawns. The most widely distributed native turfgrass in Oklahoma is buffalograss. However, blue grama, hairy grama, tumblegrass, windmill grass, sand lovegrass, inland saltgrass, nimblewill and Texas bluegrass also are native perennial grasses that form mixed species grass lawns around the state.

Bluegrasses, fescues, ryegrasses and bentgrasses are common in cool, humid areas. Warm, humid areas are home to Bermudagrasses, zoysiagrasses, St. Augustine grasses, bahiagrasses and centipedegrasses. Buffalograsses persist in warm dry areas. Introduced species of turfgrass can be grown successfully when they are grown in areas that meet their climate needs (water, temperature), but added inputs such as fertilizer, herbicides, fungicides, irrigation and mowing increase the density and aesthetic values of a lawn. By getting consumers to strive for the “perfect” lawn, the lawn care companies were creating more demand for agricultural chemicals, until enough demand spurred the development of chemicals specifically for lawn care. Demand also increased for tools to achieve the goal of the perfect lawn.

Extension and the Golf Industry – Partners in Turfgrass

The Morrill Act of 1862, the 1887 Hatch Act and the 1914 Smith-Lever Act allowed for the creation of land-grant colleges (such as Oklahoma Agricultural and Mechanical College, now

Oklahoma State University), the establishment of the USDA, the creation of the state Agricultural Experiment Station and the Cooperative Extension Service. These acts provided for the teaching of, and research into, different areas of agriculture, as well as the dissemination of agricultural research results to the general public. By 1888, the Botanical Division of the USDA was authorized to establish and maintain experimental grass stations. In 1900, the Division of Agrostology, Grass and Forage Plant Investigations published a catalog of all the known grasses in the U.S., with 14 listed as potential lawn grasses. Requests were coming in from around the country for trial packages of seeds suitable for lawns, golf courses, fairgrounds and parks across the U.S. Little was known about suitable grasses for different climates and soils, so mixtures of seeds from several species were planted to see which species would work best in varying conditions.

Dr. William J. Beal of the Michigan Agricultural Experiment Station did some of the first scientific turfgrass research in the 1890s, although amateur turf research started in 1885 at Olcott Turf Gardens in Connecticut. That research turf was moved to the home of enthusiastic golfer Frederick Winslow Taylor's home in 1910, where he spent five years trying to grow grass for putting greens. In 1912, the USDA published Farmers' Bulletin 494, "Lawn Soils and Lawns," with detailed information on the importance of soil quality, drainage, organic material and fertilizers on grass growth, as well as grass species recommended for sunny and shady locations. Establishment and maintenance of seeded and sodded lawns were also detailed. Also noted were other ground covers to be used in areas where grass wouldn't establish well.

As golf continued to increase in popularity, greenskeepers at golf courses asked the Cooperative Extension Service for more information on maintaining quality turfgrass. In 1935, Dr. Fred V. Grau became the first full-time Extension turfgrass specialist in the U.S. In areas of the country that were becoming more urban, the increased work on turfgrass at Agricultural Experiment Stations may have been a way to maintain funding and jobs for the staff. The U.S. Golf Association started giving financial support to many Agricultural Experiment Stations to assist with lawn and turfgrass research, including grass hybridization. They also started giving scholarships and research grants to state agricultural colleges to further research. The first Oklahoma Turfgrass Conference was held in 1946 by a traveling group of industry professionals for the purpose of educating new professionals in the burgeoning field of turfgrass management. The Oklahoma Turfgrass Research Foundation (OTRF) was created in 1963 to host an annual turfgrass conference and trade show for turf management professionals, as well as to fund research to further the understanding and successful management of turfgrasses. By the mid to late 1960s, most states were conducting some type of turfgrass research.

The 1950s ushered in the "turfgrass revolution," made possible through the combined efforts of Experiment Stations as well as individual and industrial research. Improved cultivars; more effective chemicals for control of weeds, insects and diseases; fertilizers specifically made for turfgrass applications; and major advances in the mechanization of mowing, fertilizing, irrigating and chemical applications were some of the achievements of the time.

While the environment can be managed to suit different turfgrasses, such as removing shade, increasing or decreasing

water, lime or fertilizer; modifying drainage; controlling pests or using different cutting heights or frequencies; and changing turfgrass genetics to match the existing environment or management scheme is best. Turfgrass cultivars can be improved through researching grass genes to find suitable turfgrasses for an environment, or grasses can be bred to create new cultivars.

The developments in the turfgrass industry from the early 1800s to the efforts of turfgrass research and breeding today, coupled with a 40-hour work week provided more time for leisure and more affluent lifestyles, making the "American" landscape possible for more Americans than ever.

Turfgrass and the First Oklahoma Agricultural Experiment Station

B.B Telley of Mangum brought the first Bermudagrass sod to what is now Oklahoma in 1887 (when Greer County was still part of Texas). He used it to start a pasture and was happy with the results. The Oklahoma Agricultural Experiment Station was established in 1892, with the first station in Stillwater at Oklahoma Agricultural and Mechanical College (now OSU), and experiments with Bermudagrass started that year. Some farmers had tried growing lawns at the turn of the century, with little success, but by 1902, farmers in seven Oklahoma counties had success with bermudagrass pastures and lawns.

John Fields, a chemist at the Oklahoma Agricultural Experiment Station at Oklahoma Agricultural and Mechanical College in Stillwater, Oklahoma, spent 10 years beautifying the campus using Kentucky bluegrass, orchard grass, meadow fescue, clovers and a variety of mixes. Bermudagrass was the only truly successful ground cover, so he planted it on the Oklahoma A&M farm. He sodded campus with Bermudagrass, used it in livestock pastures and published an Extension bulletin on it in 1902. He and other researchers developed a hardy Bermudagrass and they would grow and ship roots to anyone willing to pay for the shipping. By 1906, more than 600 Oklahoma farmers had received Bermudagrass from John Fields and many started called him "Bermuda John" (Green, p. 70). The only farmer who didn't have success with Bermudagrass was a chicken farmer whose chickens scratched among the roots of the newly planted grass. Eminent citizens such as former governor Thompson B. Ferguson requested Bermudagrass for their lawns, and this increased Bermudagrass popularity in Oklahoma.

However, not everyone liked or trusted Bermudagrass. Some farmers believed it was toxic to livestock, and many didn't like its looks because of the coarse leaves, the lack of cold hardiness, the brown leaves during winter and the lack of a "smooth carpet" look. Also known as wire grass, dog's tooth grass and devil grass, some Experiment Station staff wanted to know how to replace the Bermudagrass with clover and bluegrass.

Turfgrass and Oklahoma State University

Research in turfgrass is a big part of Oklahoma State University's agriculture college, now known as the Ferguson College of Agriculture. Agronomist Jack R. Harlan traveled worldwide in the 1960s and collected more than 700 varieties of Bermudagrass to breed for improved pastures. Over 78 experimental strains were being tested by 1969 at field stations

around the state. In 1973, two new varieties of Bermudagrass – Hardie, a cross of grasses from Turkey and Afghanistan; and Oklan, a cross of grasses from Turkey and Madagascar, were released. Bermudagrass is the species most commonly used for sports fields and lawns in the warm areas of the U.S. and around the world. It forms sod, lives almost indefinitely, tolerates frequent mowings (such as on golf courses), can withstand periods of drought and has few pests.

There are many attributes that impact turfgrass quality depending on the use of the turfgrass (golf, lawns, sports fields, etc.). One thing to consider when evaluating turfgrass quality for a specific use is the uniformity of the grass; this would include thick cover (no bare areas), no weeds and no blemishes because of injury caused by pests or diseases. Another important quality is density, measured in shoots or leaves per unit area. The denser the turf, the better it looks and the more effective it is in crowding out weeds. The texture of a grass refers to the width of individual leaves. Fine grasses are usually preferred. If a mix of species is used for an application, similar textures should be used. Grasses have growth habits that contribute to quality. Some grasses grow vertically, others prostrate and stay low and still others may swirl. Smoothness is an important quality for golf courses, especially on golf greens where the ball should roll true and with less friction to slow the ball. Color is a trait whose quality depends upon personal preference, but in a mix of grasses, the color should be uniform. These turfgrass qualities can be manipulated through genetics, management and environmental factors.

Because of Oklahoma's central location, many grasses that can grow in northern, southern and western states can grow somewhere in Oklahoma, depending on the local conditions. For lawns in full sunlight, bermudagrass, buffalograss, centipedegrass and zoysia are common. Partially shaded lawns do well with tall fescue, Kentucky bluegrass and zoysia also can tolerate this location. Kentucky bluegrass and St. Augustine grasses also are adapted to parts of the state. Improvements in each species have the potential to expand each of their ranges in Oklahoma. Growing turfgrass in Oklahoma and other states located in the central U.S. between north and south is tricky. This area is known as the "transition zone" and is the rough boundary between warm-season and cool-season growing conditions. Starting in the 1950s, professors in the then Agronomy Department started breeding grasses for use in this zone. With specimens of Bermudagrasses from Africa, Australia, Europe and Asia in addition to the varieties initially collected by J. R. Harlan, OSU researchers had ample varieties

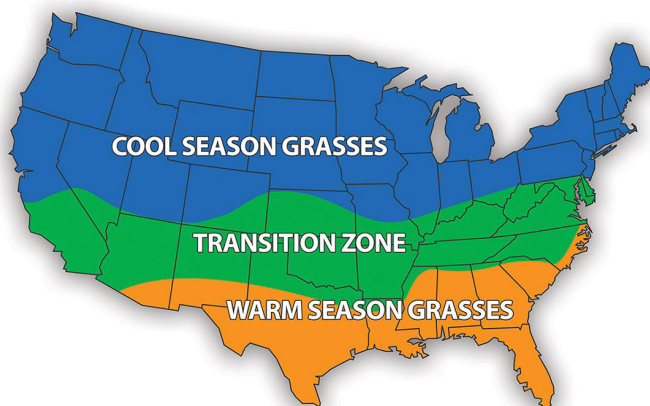


to draw from while breeding new cultivars. The first commercial sod production farm in Oklahoma was started in 1951. The first survey of turfgrasses in Oklahoma was in 1978. By then, there were more than 450,000 home lawns comprising about 94,000 acres. Golf courses maintained about 16,800 acres of turfgrass.

In 1986, OSU's Dr. Charles M. Taliaferro started a Bermudagrass breeding and genetics research program with goals to create cold-hardy varieties that can stand up to the intense wear and tear of sports field use. OSU researchers have worked both independently and with industry partners, with much financial support from the U.S. Golf Association, to introduce new Bermudagrass cultivars, such as Yukon, Riviera, Patriot, NorthBridge, Tahoma 31 and Latitude 36. These improved varieties have been extensively used in the U.S.'s transition zone as well as other countries around the world. Many of these cultivars are used for sports fields.

Tahoma 31 ("Tahoma" is a Native American word meaning "frozen water") is in the football stadium of the Philadelphia Eagles. The USA Softball Hall of Fame, in Oklahoma City, laid 52,100 square feet of Tahoma 31 in their field renovation in 2020. As one of the first Bermudagrasses to green up in the spring and one of the last to go dormant in autumn, softball games in that stadium are usually on a green field. Latitude 36, consistently in the top performers in the National Turfgrass Evaluation Program, has been installed on collegiate and professional football fields, for teams such as the Baltimore Ravens. It also has been used on sports fields overseas, in Qatar and Turkmenistan. NorthBridge Bermudagrass is used by professional baseball and soccer teams at Louisville Slugger Field in Kentucky and also is on practice fields at the University of Oklahoma. Riviera Bermudagrass was used on two of the baseball fields for the 2008 Beijing Summer Olympics, and also is on the Hedge practice field at Oklahoma State University. Latitude 36 is on the football field at Memorial Stadium on the campus of the University of Oklahoma, ensuring that the OSU football team always plays the Bedlam game on its home turf!

At the OSU Turfgrass Research Center, research plots are used to determine the extent to which different grass varieties handle shade and heat, have desired colors and textures, have good density and recovery from injury and even which varieties are best at standing up to wear and tear. A rotational traffic simulator with differential irrigation allows grasses to be analyzed for wear and tear in both wet and dry conditions.



Today's Trends

Lawns are seen by people the world over as “American.” Many Americans view lawns as a “natural” and even compulsory element of urban landscapes. Americans create lawns in communities across their own country as well as throughout the world, at embassies and consulates. The American connection to lawns is so strong that during the Chinese Cultural Revolution, lawns established under American or British influence were ripped out. Today, about a quarter of all urban land in the U.S. is covered in lawns. In 2005, lawns covered an area the size of Texas. The average U.S. household in 1999 spent more on lawn care (\$222) than for flower gardens (\$94) or vegetable gardens (\$91). Turfgrass is the largest irrigated crop in America (if lawns are counted as a crop) and its main purpose is to make us look and feel good.

Lawns are today, as in decades past, an indicator of success; homeowners must have the means to take care of them. Well-kept lawns are seen as demonstrations that the property owner cares about the community, property and resale values, and about being a “good neighbor.” Homeowners associations often have regulations about lawn care and enforce those regulations with fines for those not keeping their lawns looking nice.

Nevertheless, many resources are needed, which can be seen as wasteful, to maintain a well-kept lawn. Especially in regions prone to drought; lawns require so much water that some Californians have started shaming people who water lawns. Lawns intensively managed with mowing, spraying of chemicals and irrigation can potentially have negative effects on the environment, especially if chemicals such as fertilizer are not applied based on soil test indications. High levels of fertilizer applied by consumers contributes significantly to water quality problems such as eutrophication. These issues have led some homeowners to use “natural” chemicals on their lawns, or to accept less pristine turfgrass areas.

Lawns and turfgrasses can positively affect the environment with the services they provide. Plants of all types filter the air and reduce noise pollution. Their roots absorb rainwater and prevent runoff and soil erosion. In cities, up to 60% of rainwater hitting paved surfaces runs off, taking surface oils and trash to the sewers or streams. Only 5% to 15% of rainwater hitting permeable surfaces, such as lawns, is runoff. The rest soaks into the ground to replenish the water table and support plant and animal life. Grass roots also filter sewage and can remove toxic chemicals from the landscape in a process called phytoremediation. Turfgrass and other ground cover can reduce heat buildup in cities and serve as habitat for insects and other animals.

Green spaces, which frequently incorporate turfgrass, provide a break from the visual pollution of city infrastructure. The beauty in parks, along streets and around homes bolsters mental health. Turfgrass around businesses creates a favorable impression to employees and the public and increases property values. Turfgrass also provides a safety feature. Natural turf reduces injuries in sports players and stabilizes soil and dust at airports, prolonging engine life. Areas next to highways that are stabilized with turf help safely stop vehicles that have left the road.

Turfgrasses near a home can protect it from fire. Irrigated and mown turfgrass closely surrounding a house, instead of large trees and shrubs, is a large factor in whether a home or other building survives wildfires. Eastern redcedar, an invasive

species in the state, contains volatile oils that ignite and burn easily. If trees such as this are cleared for several hundred feet around buildings and the land close to a building is covered in irrigated, closely-mown grasses, the likelihood increases that the building will survive a wildfire. Grasses provide “defensible space,” an area that provides firefighters easy access to a safe area from which to fight fires.

Conclusion

Well-maintained or not, lawns are a large part of American cities and suburbs. The state of a lawn in America is often seen as an indicator of socioeconomic status, pride and even neighborliness. Throughout history, the evolution of turfgrasses has run alongside the needs of man, providing safety, comfort, mental health, recreation and even shelter. As technology and culture change, so do the qualities and uses of turfgrass. Seen as mostly an American characteristic, lawns provide services in the social, historical, aesthetic and cultural realms. Though sometimes vilified for their extensive maintenance needs, lawns and turfgrass provide much solace in a complex society, and are here to stay.



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